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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,217	03/08/2004	Abhinav Gupta	50277-2328	2706

42425 7590 04/19/2007	EXAMINER	
HICKMAN PALERMO TRUONG & BECKER/ORACLE	STEVENS, ROBERT	
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SUITE 550	ART UNIT	PAPER NUMBER
SAN JOSE, CA 95110-1089	2162	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

	Application No.	Applicant(s)
Office Action Summary	10/796,217	GUPTA ET AL.
	Examiner	Art Unit	
	Robert Stevens	2162	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>19 January 2007</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-41</u> is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-41</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a)☐ All   b)☐ Some * c)☐ None of:

         1.☐ Certified copies of the priority documents have been received.

         2.☐ Certified copies of the priority documents have been received in Application No. _____.

         3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
     Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
     Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1.   The Office withdraws the previous objection to the claim 13, in light of the

amendment. The Office withdraws the previous rejections of the claims under 35 USC

§102(b). The Office substantially maintains the previous rejections of the claims or sets

forth new claim rejections under 35 USC §§101, 112-2nd paragraph and 103(a), in light

of the amendment.

Response to Arguments

2.   Applicant's arguments filed 2/2/2007have been fully considered but they are not

persuasive.

        Regarding the claim rejections under 35 USC 101, Applicant asserts on pages

11-12 that the claims reflect a useful, concrete and tangible result because data

densification has may uses, as reflected in the specification. Additionally, Applicant

asserts that the transformation of computer data format is not mathematical in nature.

Applicant also asserts that the claiming of a computer readable storage medium

overcomes the rejections of the claims that encompass non-statutory subject matter.

        The Office respectfully disagrees. The Office notes that Applicant's arguments

are directed to a use being set forth in the specification. However, the claims are at

issue in these rejections. The claims merely indicate a transformation of data with no

use of that transformed data, such as its presentment to a user or follow its use in

processing. The Office notes that data transformations are mathematical in nature, as they represent boolean operations (e.g., AND, OR, XOR) on data. Additionally, Applicant's written description did not support the terminology "computer readable storage medium". There was no explicit use/definition of "computer readable storage medium" in the as-filed specification, including the claims and drawings. The Office also notes that Applicant's specification at paragraph [0203] appears to categorize carrier waves as either a storage device or non-volatile media.

Regarding the rejection of the claims under 35 USC 112-2nd, Applicant appears to assert that the general rule is that negative limitations are inherenetly acceptable, and thus the rejected claims that cite "not sorting" are inherently unambiguous.

The Office respectfully disagrees. The general rule in patent and contract law (patents being a form of contract between an inventor and the public) is that negative limitations are inherently ambiguous. The MPEP allows for exceptions to the general rule. For example, in the case where an Applicant claims "a halogen, not fluorine", the number of possibilities can be determined (i.e., 5 possible halogens minus 1 leaves four possible halogens). Thus, when there is a limited number of possibilities in the "positively recited" portion of the claim, the claim will be clear if a possibility is excluded. However, when one begins with an unlimited number of possibilities in the "positively recited" part of the claim, carving out one possibility still leaves one with an unlimited number of possibilities, and thus that claim that is unclear and/or overbroad. The "generating" limitation, as positively recited in Applicant's claims, represents an

unlimited number of possibilities. Carving out a "not sorting" limitation merely excludes

one possibility from an unlimited number, leaving an unlimited number of possibilities.

(I.e., mathematics considers infinity minus one to still be infinity.) Thus, these claims

are unclear or overbroad, as currently recited. The way to avoid such an issue is to

positively claim the inventive subject matter. (I.e., Recite: "Perform X, Y and Z." Not:

"Perform X and Y, but not A.") This puts the public on notice as to what the Applicant

regards as the Applicant's invention rather than what Applicant doesn't regard as

Applicant's invention.

Regarding the rejection of the claims under 35 USC 102(b), these rejections

have been withdrawn, in light of the amendment.

In regard to the Rogers reference, Applicant asserts that the "Name" dimension

of Figure 1D: 1) cannot be made dense and 2) is not dense because it does not contain

all values of the "Department" dimension. Additionally, Applicant asserts that claim 17

is patentable for the reasons set forth regarding claim 1.

The Office respectfully disagrees. First, there is nothing in Applicant's claims that

limits "densification" to a particular dimension. The claim is directed to a "first

dimension". Additionally, the Office notes that the specification (at paragraph [0004])

merely states that a "set of data items is dimensional if each data item in the set is

associated with a value from a particular dimension". In Figure 1D, each data item or

row is associated with a name value from the "Name" dimension. Second, the "Name"

dimension was declared dense, as having all name values represented in the table, not

the "Department" dimension. The claim only recited that a "first" dimension, not every or more than one dimension, be dense.

Additionally, the Office respectfully disagrees with Applicant's assertion regarding claim 17. The Office asserts the same rationale set forth regarding claim 1, above, in countering Applicant's assertion vice claim 17.

The remaining claims are no longer rejected under 35 USC 102(b).

Regarding the rejection of the claims under 35 USC 103(a), Applicant asserts on pages 15-16 that claims 3, 6-15 and 19-39, which depend upon or are analogous to claims 1 or 17, are patentable for the reasons asserted regarding claims 1 and 17.

The Office respectfully disagrees for the reasons set forth above regarding claims 1 and 17.

Regarding new claims 40-41, Applicant asserts that these claims recite features that were not even alleged to be disclosed by any of the cited references.

It is unclear why these claims would have been expected to have been addressed in the previous Action, as they did not exist at that time.

For at least these reasons, the Office asserts the rejections of the claims as set forth below.

Claim Rejections - 35 USC § 101

3.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of
> matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the
> conditions and requirements of this title.

4.   **Claims 1-39 are rejected under 35 U.S.C. 101** because the claimed invention is

directed to non-statutory subject matter.

To be statutory, a claimed computer-related process must either: (A) result in a

physical transformation outside the computer for which a practical application is either

disclosed in the specification or would have been known to a skilled artisan, or (B) be

limited to a practical application with useful, concrete and tangible result.

A practical application can be either physical transformation or a useful, concrete

and tangible result.

Regarding independent claims 1 and 17: These claims are directed to the

formulation of a data set, but do not necessarily bring the data into existence in a form

which enables any usefulness of having generated the data to be realized. In both

instances, the claimed steps appear to be pure mathematical manipulations rather than

a practical application of those manipulations with a tangible result that enables any

usefulness of the results to be realized.

Claims 1 and 17, and other claims that depend on them, are not patent

eligible because the invention recited therein does not produce a useful, concrete and

tangible result.

Further regarding claims 19-36: In the preamble, these claims recite a

machine-readable medium. Such a medium encompasses transmission media, for

example, as stated on page 47 in paragraph [0105] of the as-filed specification. Current

Office policy is that transmission media, such as a wires or fiber optics, is not

considered a tangible embodiment of data. I.e., a wire does not "store" data. It merely

provides a conduit for transporting data from one storage component to another. One

way to correct the claim language is to recite the storage of the claimed subject matter

on a tangible medium, as reflected in the as-filed specification.

Further regarding claims 37-39: These claims are directed to a system for

implementing the nonstatutory claims 1 and 17-18. As such, these claims encompass a

machine for carrying out a mathematical algorithm (i.e., performing a join, or union,

logical mathematical operation), and thus reflect non-statutory subject matter.

Claim Rejections - 35 USC § 112

5.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6.   **Claims 19-36 and 41 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claims 19-36 and 41: These claims were amended to contain the terminology "computer readable <u>storage</u> medium." Emphasis added. This terminology did not appear in the as-filed specification, including the drawings and claims, and as such constitutes new matter. .

7.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8.   **Claims 1-41 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding independent claim 1: It is unclear how one determines what is "a different one of the subsets of data". Emphasis added. There was no recited mechanism for differentiating between subsets. As such, there appear to be missing essential steps/elements, rendering the claim unclear.

Claims 2-16, 19-34, 37 and 40-41 are dependent upon claim 1, and therefore likewise rejected.

Regarding claims 17 and 18: These claims recite the negative limitation (claim 17 at line 5, claim 18 at line 2) "wherein the generating is performed without performing ... ". [Emphasis added.] The claim meaning and scope are unclear.

Claims 18, 35-36 and 38-39 are dependent upon claim 17 (and claim 18, as appropriate), and therefore likewise rejected.

Claims 1 and 17, and other claims that depend on them, are not patent eligible because these claims are vague and ambiguous, and thus, the scope of each is indeterminable.

9.   **Claims 1-41 are rejected under 35 U.S.C. 103(a)** as being unpatentable over

Rogers (US Patent No. 6,397,214, filed Nov. 3, 1998 and issued May 28, 2002,

hereafter referred to as "Rogers") in view of Graefe et al. (US Patent No. 6,298,342,

filed Mar. 16, 1998 and issued Oct. 2, 2001, hereafter referred to as "Graefe").

        Regarding independent claim 1: Rogers discloses *A machine-implemented*

method comprising the steps of: generating, based on a first set of data

associated with a plurality of dimensions, a second set of data; wherein the first

set of data is not dense relative to a first dimension of the plurality of dimensions;

(See Rogers noting the transition from Figure 1A to Figure 1D, in context of the

Abstract, disclosing the creation of a second data set, 1D, that is denser than a first data

set, left table of 1A.) *wherein the first set of data includes a plurality of subsets of*

data; (See Rogers Figure 1A, left table, comprised of several records.) *and wherein*

the step of generating includes performing a plurality of mini join operations,

wherein each mini join operation involves an outer join between a third set of

data and a different one of the subsets of data. (See Rogers Figure 1D in the context

of column 2 lines 51-52, disclosing a Full outer join performed using the left [1st data set]

and right [2nd data set] tables of Figure 1A.)

        Rogers does not explicitly teach the remaining limitations as claimed. Graefe,

though, discloses *wherein the second set of data is dense relative to the first*

dimension; (See Graefe Fig. 3 Table #430 showing the dense "year" dimension, in the

context of col. 7 lines 34-51 discussing the mathematical analogy between the JOIN

operations and relational calculus.)

It would have been obvious to one of ordinary skill in the art at the time of the

invention to apply the teachings of Graefe for the benefit of Rogers, because to do so

provided a programmer with an ANSI standard SQL mechanism for implementing an

outer join, as taught by Graefe in the Abstract. These references were all applicable to

the same field of endeavor, i.e., data base join operations.

Regarding claim 2: Rogers teaches *wherein the first set of data includes*

rows that are associated with dimension value combinations in which the

dimension value combinations are combinations of dimension values selected

from the plurality of dimensions, (See Rogers Figure 1A, noting "Department" and

"Name" dimensions of the left table.) *wherein the second set of data includes*

corresponding rows for the dimension value combinations that correspond to the

rows of the first set of data, (See Rogers Figure 1A, noting the "Name" dimension of

the right table.) *wherein the corresponding rows are associated with the dimension*

value combinations, (See Rogers Figure 1A, noting the "Name" dimension of the left

and right tables.) *and wherein the step of generating comprises the steps of*

checking if a corresponding row exists in the second set of data for a set of

dimension value combinations, wherein the set of dimension value combinations

is dense with respect to one dimension; (See Rogers Figure 1D, noting

combinations are dense with respect to the "Name" dimension.) *and creating the row*

if the corresponding row does not exist. (See Rogers Figure 1D, noting the creation

of Accounting/John Smith/1533 record [i.e., row], for example.)

Regarding claim 3: Rogers does not explicitly teach the remaining limitations as

claimed. Graefe, though, discloses *wherein the step of checking is performed*

within a set of nested loop instructions that perform one loop for each dimension

value combination of the set of dimension value combinations. (See Graefe

column 7 lines 57-60, discussing that nested loops use one of three basic methods for

performing a JOIN operation.)

Regarding claim 4: Rogers teaches *wherein each of the subsets of data is a*

single row of data. (See Rogers Figure 1A, left table.)

Regarding claim 5: Rogers teaches *wherein each of the subsets of data is a*

partition of the first set data, and is associated with a single dimension value

selected from one dimension of the plurality of dimensions. (See Rogers Figure

1A, left table and noting that each row has a unique "Name" dimension value.)

Regarding claim 6: Rogers does not explicitly teach the remaining limitations as

claimed. Graefe, though, discloses *wherein the step of generating is performed in*

response to detecting a data manipulation language statement. (See Graefe

column 7 lines 2-18, discussing the use of SQL in a JOIN operation.)

Regarding claim 7: Rogers does not explicitly teach the remaining limitations as claimed. Graefe, though, discloses *wherein the step of generating includes performing the outer join on a first subset using a first processor and performing the outer join on a second subset using a second processor that is different than the first processor.* (See Graefe column 4 line 65 – column 5 line 8, discussing various hardware configurations.)

Regarding claim 8: Rogers teaches *wherein the outer join is a right outer join.* (See Rogers Figure 1B.)

Regarding claim 9: Rogers teaches *wherein the outer join is a right outer join.* (See Rogers Figure 1C.)

Regarding claim 10: Rogers does not explicitly teach the remaining limitations as claimed. Graefe, though, discloses *wherein the step of generating is performed by an SQL engine.* (See Graefe column 7 lines 2-18, discussing the use of SQL in a JOIN operation.)

Regarding claim 11: Rogers does not explicitly teach the remaining limitations as claimed. Graefe, though, discloses *wherein the step of generating includes receiving an expression that indicates a partitioning key for partitioning the first*

set of data. (See Graefe column 7 lines 40-44, discussing the use of an employee

name key.)

Regarding claim 12: Rogers does not explicitly teach the remaining limitations

as claimed. Graefe, though, discloses ***wherein the outer join is associated with join***

conditions that includes a Boolean expression. (See Graefe column 7 line 43, noting

the equality condition for employee.dept_id and department.dept_id.)

Regarding claim 13: Rogers does not explicitly teach the remaining limitations

as claimed. Graefe, though, discloses ***wherein said first set of data includes a first***

set of rows; and wherein said outer join is between said first set of rows and a

second set of rows, and the step of generating includes sending each of a

plurality of processes a subset of said first set of rows and all of said second set

of rows. (See Graefe column 7 lines 36-44, discussing SQL processing code.)

Regarding claim 14: Rogers does not explicitly teach the remaining limitations

as claimed. Graefe, though, discloses ***wherein the generating includes specifying at***

least one dimension of the plurality of dimensions, (See Graefe column 7 line 43,

noting the specification of an employee dimension.) ***and hash partitioning the first set***

of data with respect to the dimension specified. (See Graefe column 7 line 59,

discussing the well-known hash-join operation.)

Regarding claim 15: Rogers does not explicitly teach the remaining limitations as claimed. Graefe, though, discloses *detecting a construct that includes a condition limiting which dimension value combinations are included in the second set of data; and in response to detecting the other construct, performing the operation only with respect to the dimension value combinations to which the second set of data was limited.* (See Graefe column 7 lines 36-44, discussing SQL processing code.)

Regarding claim 16: Rogers teaches *wherein the first set of data is associated with a plurality of dimensions, the second set is associated with the plurality of dimensions, and the second set of data is denser with respect to one of the plurality of dimensions.* (See Rogers Figures 1A and 1D, noting that 1D is denser than 1A.)

Regarding independent claim 17: Rogers discloses *A machine-implemented method comprising: generating, based on a first set of data associated with a plurality of dimensions, a second set of data; wherein the first set of data is not dense relative to a first dimension of the plurality of dimensions;* (See Rogers noting the transition from Figure 1A to Figure 1D, in context of the Abstract, disclosing the creation of a second data set, 1D, that is denser than a first data set, left table of 1A.) *wherein the generating is performed without sorting the first set of data for*

distinct values of a second dimension of the plurality of dimensions. (See Rogers

Figure 1D in the context of column 2 lines 51-52, disclosing a Full outer join performed

using the left [1st data set] and right [2nd data set] tables of Figure 1A, without sorting. It

is further noted that Figure 1 #102 of Applicant's specification is the step "Sort Distinct".)

Rogers does not explicitly teach the remaining limitations as claimed. Graefe,

though, discloses *wherein the second set of data is dense relative to the first*

dimension; (See Graefe Fig. 3 Table #430 showing the dense "year" dimension, in the

context of col. 7 lines 34-51 discussing the mathematical analogy between the JOIN

operations and relational calculus.)

It would have been obvious to one of ordinary skill in the art at the time of the

invention to apply the teachings of Graefe for the benefit of Rogers, because to do so

provided a programmer with an ANSI standard SQL mechanism for implementing an

outer join, as taught by Graefe in the Abstract. These references were all applicable to

the same field of endeavor, i.e., data base join operations.

Regarding claim 18: Rogers teaches *wherein the generating is performed*

without performing a sort of the first set of data in which the sort of the first set of

data is used to find distinct values of a second dimension of the plurality of

dimensions. (See Rogers Figure 1D in the context of column 2 lines 51-52, disclosing

a Full outer join performed using the left [1st data set] and right [2nd data set] tables of

Figure 1A, without performing the actions listed.)

Claims 19-36 are substantially similar to claims 1-18, and therefore likewise

rejected. It is noted that these claims also recite the use of one or more processors.

Rogers does not explicitly teach the use of a particular hardware configuration. Graefe,

though, discloses the use of processors (See Graefe column 4 line 65 – column 5 line 8,

discussing various hardware configurations.)

Claims 37-39 are substantially similar to claims 1, 35 and 36, and therefore

likewise rejected.

Regarding claim 40: Rogers teaches *wherein all elements of the third set*

are preserved in results of each mini join operation regardless of whether the

elements of the third set match any elements of a subset involved in that mini join

operation. (See Rogers col. 1 lines 27-33, discussing a full outer join in which the

records of each table are found in the resulting table.)

Claim 41 is substantially similar to claim 40, and therefore likewise rejected.

Conclusion

10.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

Non-Patent Literature
        Theodoratos, Dimitri, et al., "Heuristic Optimization of OLAP Queries in
Multidimensionally Hierarchically Clustered Databases", <u>DOLAP '01</u>, Atlanta, GA,
Nov. 9, 2001, pp. 48-55.
        Hurtado, Carlos A., et al., "Updating OLAP Dimensions", <u>DOLAP '99</u>, Kansas
City, MO, © 1999, pp. 60-66.
        Nemic, Jaromir D.B., "Partitioned Outer Join", Jul. 1, 2004, pp. 1-7
(downloaded from: www.db-nemec.com/Partitioned_outer_join.html).

US Patent Application Publications

Tse et al	2002/0078018
Hopeman et al	2002/0194163

US Patents

Leung et al	6,625,593
Liu et al	6,397,204
Witkowski et al	6,345,272
Malloy et al	5,905,985

11.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

        A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the date of this final action.
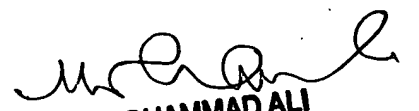
Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert Stevens whose telephone number is (571) 272-4102. The examiner can normally be reached on M-F 6:00 - 2:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Breene can be reached on (571) 272-4107. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Robert Stevens
Examiner
Art Unit 2162

April 12, 2007

MOHAMMAD ALI
PRIMARY EXAMINER